

Enhancing Trust in Dental Care Recommendation Systems:

Using Trust-enhanced Information from Social Networks to
Improve the Matching between Patients and Dentists

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CERTIFICATE OF ORIGINAL AUTHORSHIP

This thesis is the result of a research candidature conducted jointly with another research organisation as part of a collaborative Doctoral degree. I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as part of the collaborative doctoral degree and/or fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student:

Date:

*To my parents
(my father the late Indra Prasad Dev Pradhan
and
my mother Kamala Pradhan)
for their support and inspiration.*

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I have been tutoring IT subjects at the University on a part time basis while working full time in the industry. In 2010, I wanted to continue my studies and start my PhD degree. My wife also encouraged me to fulfil my dream to obtain a PhD degree. Due to the explosive growth in social networking sites, I decided to explore social trust that can be derived from these sites. So, I decided to work in trust models for recommendation systems with great help from my supervisors.

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Abstract

The recent growth in social media has impacted the way users are searching and sharing health information online. Crowdsources, such as review and rating websites, provide an outlet for consumers to share their opinions on healthcare professionals. Yet, faced with the enormity and diversity of information across multiple online sources, finding the right information can be a challenge for users, particularly when there is no consistency in the evaluation criteria across various sources. This difficulty is manifested when existing review and rating websites do not take patient information into consideration. Extremely biased views – positive or negative – are capable of skewing recommendations and thereby compounding the situation. This makes it important to filter trustworthy information from health social networks and dental crowdsources. In the case of dental care, the invasive nature of many dental treatments highlights the importance of selecting a suitable trustworthy provider for many patients, who may be anxious or reluctant to visit a new dentist.

By analysing, from multiple perspectives, the trustworthiness of information available to patients, this study proposes a new trust-enhanced information model for dental care recommendation systems. In this model, dentists are profiled based on subjective information extracted from dental crowdsources. Subjective qualities are also used to profile patients. Currently, online social network data cannot be used for profiling purposes due to privacy and identification concerns. Instead, one of the popular personality tests, the DISC personality test, is used in this study. The importance and suitability of subjective qualities for recommendations is explored. Two matching algorithms are evaluated based on the responses to an online survey. When the patients are classified based on their levels of fear, preferred search methods and other attributes, their list of recommended dentists changes. The subjective characteristics of both patients and dentists are important factors which need to be incorporated to improve the matching capability of dental care recommendation systems.

Including the subjective qualities of users could change the way that recommendations are provided in the future, especially in the health sector where the wrong information can lead to adverse impacts on health. Although patients' discussions about their health are sensitive and private, they can benefit from more accurate recommendations in relation to health care providers.

Keywords: health social networks, social media, review and rating sites, reputation, trust, profiling, matching, recommendation system